NOV 2 3 1987

GA1.13:RCED-86-231BR

United States General Accounting Office

GAO

Briefing Report to the Honorable Gerald D. Kleczka, House of Representatives

COMPLETED
21

September 1986

EPA CONSTRUCTION GRANTS

Information on the Milwaukee Area Sewerage System Improvement Program

ORIGINAL

GAO/RCED-86-231BR

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-224149

September 29, 1986

The Honorable Gerald D. Kleczka
House of Representatives

Dear Mr. Kleczka:

As requested by your letter of March 20, 1986, and as subsequently agreed to with your office, we obtained certain information on the Milwaukee Metropolitan Sewerage District's Water Pollution Abatement Program. The Milwaukee program was initiated in response to federal and state court lawsuits to halt Lake Michigan pollution by improving metropolitan Milwaukee's sewage system. Components of the program are under construction, and about one-third of its estimated $1.7 billion cost may be federally funded through the Environmental Protection Agency (EPA). On May 13, 1986, we briefed you on the information we had obtained. As agreed, this report summarizes the material presented at that briefing.

Specifically, we obtained information on (1) whether the grantee, the Milwaukee Metropolitan Sewerage District (district), meets federal criteria for an eligible grantee and how federal funds are safeguarded, (2) how district projects are funded, (3) the extent of competitive bidding for architect and engineering work, (4) why the job site rule, which limits allowable overhead billings, was not applied to the prime contractor responsible for the program's management oversight and technical integrity, (5) the federal role in the district's decision to use rock removed from a project site to build a recreation island, and (6) architect and engineering costs and approaches for measuring the reasonableness of such costs.

According to district officials, the Milwaukee program is about $360 million under budget and on schedule with a 1996 target completion date. Brief summaries of the six issues follow.

--The district meets the federal criteria for an eligible grantee. Federal regulations require grantees to have jurisdiction over sewage disposal in their service area. The district has such jurisdiction by state statute. Grant funds are monitored through precontract award reviews by the Wisconsin Department of Natural Resources, hereinafter referred to as the department (the agency

responsible for managing EPA grants in the state). The funds are also monitored through post-contract billing audits by EPA and/or the Defense Contract Audit Agency and the department.

--District wastewater projects compete for federal and state funds through an EPA-approved, Wisconsin project priority system as federal regulations require. Program funding decisions are reviewed by EPA, the department, and the Wisconsin Dane County Court whose order outlines the scope and timetable for completing the program.

--Federal and Wisconsin regulations permit architect and engineering contracts to be competitively negotiated and do not require advertised competitive bidding. As permitted, the district's architect and engineering contracts were awarded through a competitively negotiated procurement process.

--The job site rule was not applied because EPA, the Defense Contract Audit Agency, and the department determined that the operation of the prime contractor responsible for managing the planning, design, and construction of the Milwaukee program and its technical integrity did not constitute a job site because over 30 percent of the work is routinely performed at other corporate locations. Consequently, these agencies agreed that the contractor's use of a corporate overhead rate was appropriate.

--No federal funds have been involved in the disposition of rock from the north shore project site. Federal involvement has been limited to reviewing the environmental consequences of disposal, which EPA and the U.S. Army Corps of Engineers have approved.

--As of April 1986, the Milwaukee program's total estimated architect and engineering costs of $344.7 million represent about 28 percent of total estimated construction costs. Neither the EPA allowance schedules nor private sector guidelines offer complete, comparable criteria for assessing the reasonableness of these costs. The EPA schedules and the private guidelines provide criteria for basic project planning and design services but do not reflect activities such as program and construction management and other special services which have been and will be included as architect and engineering costs of the Milwaukee program. The department is developing criteria for monitoring the reasonableness of future architect and engineering costs for all state wastewater treatment projects.

We discussed the information we obtained with EPA headquarters and Chicago Regional Office officials and applicable state and city agencies' officials, and have included their comments where appropriate. Unless you publicly release its contents earlier, we will make this report available 14 days after the date of this letter. At that time copies of the report will be sent to appropriate congressional committees; the Administrator, EPA; the Director, Office of Management and Budget; and other interested parties. Please call me at (202) 275-5489 if you have any questions.

Sincerely yours,

Hugh J. Wessinger

Hugh J. Wessinger
Senior Associate Director

Contents

SECTION		Page
1	PROGRAM AUTHORITIES AND RESPONSIBILITIES	5
	EPA construction grants program	5
	Wisconsin construction grants program	5
	The Milwaukee program	5
	Objectives, scope, and methodology	8
2	QUESTIONS ON THE MILWAUKEE METROPOLITAN SEWERAGE DISTRICT'S WATER POLLUTION ABATEMENT PROGRAM	11
	Grantee eligibility and fund management	11
	District funding decisions	12
	Competitive bidding	13
	The job site rule	14
	North shore tunnel rock	15
	Program architect and engineering costs	16

TABLE		
2.1:	Projected architect and engineering costs as a percentage of construction costs	17

ABBREVIATIONS

EPA	Environmental Protection Agency
GAO	General Accounting Office
RCED	Resources, Community, and Economic Development Division

SECTION I

PROGRAM AUTHORITIES AND RESPONSIBILITIES

EPA CONSTRUCTION GRANTS PROGRAM

The Environmental Protection Agency (EPA) wastewater treatment plant construction program was created by the Water Pollution Control Act Amendments of 1956 (Public Law 84-660). The program is designed to prevent, reduce, and eliminate water pollution. Amendments enacted over the years changed the federal share of financial assistance for constructing municipal wastewater treatment plants from 30 to 75 percent. Beginning in fiscal year 1985, the federal share was limited to 55 percent of construction costs for projects that had not previously received grant funds.

WISCONSIN CONSTRUCTION GRANTS PROGRAM

The Wisconsin Department of Natural Resources, hereafter referred to as the department, administers the EPA construction grants program and the state-funded Point Source Pollution Abatement Grant Program. The Wisconsin legislature designed the Point Source program's eligibility criteria and program requirements to parallel provisions in the EPA construction grants program. The Point Source program authorizes two funding mechanisms: the Wisconsin Fund and the Combined Sewer Overflow Abatement. The Wisconsin Fund provides up to 75 percent state assistance for wastewater facilities planning and design and 60 percent for construction costs. Through the Combined Sewer Overflow Abatement financing mechanism, the state provides up to 50 percent reimbursement of costs to eliminate overflows into state waters.

THE MILWAUKEE PROGRAM

The Milwaukee Water Pollution Abatement Program began in 1977 in response to federal and state court lawsuits to stop the city from dumping raw sewage into Lake Michigan. The federal court suit, decided by the U.S. District Court for the Northern District of Illinois in 1977, would have cost about $3.2 billion, as estimated by the city, to implement. It required advanced wastewater treatment[1] and did not permit any sewage overflows. The state court suit resulted in a May 1977 Wisconsin Dane County Court order which provided for a less expensive pollution abatement alternative estimated by the city to cost about $2.1

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[1]Advanced wastewater treatment is the "polishing" stage of wastewater treatment that produces a higher quality of effluent by removing more organic and industrial pollutants than secondary treatment.

billion. The order required secondary wastewater treatment[2] and permitted a lesser level of protection than the solution contained in the federal court suit. When the U.S. Supreme Court vacated the federal court suit in April 1981, the Dane County Court order became the operative program criteria.

The court order requires major improvements in all phases of the metropolitan Milwaukee sewerage system. April 1986 estimates by the grantee, the Milwaukee Metropolitan Sewerage District (district), the latest available at the time of our work, project that the Milwaukee program, which began in 1977, will cost about $1.7 billion and be completed by 1996. This is about $360 million less than the $2.1 billion estimate made in 1983. This was the estimate made for the district's first sale of general obligation bonds. As of April 30, 1986, about $873 million had been obligated, with the federal share amounting to about $309 million. Based on 1986 funding priorities, the federal share of the remaining program costs could be as much as $250 million.

Improvements being made to metropolitan Milwaukee's sewerage system through the program include improving two wastewater treatment plants, constructing new interceptor sewers, and minimizing combined sewer overflow by building deep tunnels. Improvements to the two Milwaukee wastewater treatment plants, at Jones Island and South Shore, and new sewer construction are the most expensive activities. Work at the Jones Island ($425.9 million) and South Shore ($183.4 million) treatment plants is estimated to cost $609.3 million, or nearly 36 percent of total project costs. New interceptor sewers, which will transport sewage to the treatment plants, are estimated to cost $474.3 million, or nearly 28 percent of total project costs. Constructing the tunnels to minimize combined sewer overflows is estimated to cost $221.8 million, or about 13 percent of total costs.

The district as grantee is responsible for carrying out the Milwaukee program. To facilitate grant management and administration, the program is divided into projects and the projects into phases. EPA and department grants are awarded to the district by project phase. Program management is carried out by an organization within the district called the Program Management Office. This office is comprised of a consortium of architect and engineering firms that manage the planning, design, and construction of the Milwaukee program. One firm, CH2M Hill, acts as lead for the consortium and is the district's prime contractor for providing architectural, engineering and management services. CH2M Hill provides such services by itself or

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[2]Secondary treatment is the step in wastewater treatment in which bacteria consume the organic parts remaining in the effluent. To meet the EPA secondary treatment standards, the system must remove 86 to 90 percent of the organic pollutants and suspended solids.

subcontracts for them. Management office support is projected to cost $215.9 million, or about 13 percent of total costs. These management office costs are not directly attributable to any specific project and include items such as administrative support, contract administration, small business and minority involvement, and public information services.

According to EPA Chicago Regional Office officials, the program management office is a pioneer approach for managing wastewater treatment projects because ordinarily wastewater construction projects are managed by the grantee. District officials told us that they selected this management approach because they did not have the people and skills needed to manage a large, time-critical construction program. District officials also said this approach maximizes their control over the program while minimizing their long-term staff investment.

The primary assumption behind the program management office approach is that it would result in lower overall program costs. District officials said they believed that management and engineering costs associated with this approach would be more than offset by savings that would result from this approach through phased planning and construction, expedited critical activities and material purchases, and intensive central management.

District officials said that the program management office approach has been effective because the Milwaukee program is $360 million under budget, on schedule, and qualifies for 75 percent EPA grant funds. Part of the projected $360 million savings is a $101 million savings in management consulting fees.[3] District records showed that the $101 million could be saved by the district if program management duties ended in 1990, instead of waiting until 1996 when construction is scheduled to be complete. District officials said that by 1990, the complex planning and design work, needed at the beginning of the Milwaukee program, will be complete and the district will be able to manage the remaining construction work. To facilitate the transition in 1990, district employees are working with their program management office counterparts and preparing to assume full responsibility. Program management office support plus consulting architect and engineering costs totaled $274 million as of April 1986. CH2M Hill received $129.1 million of the $274 million as program

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[3]District and Program Management Office officials used 1983 as their benchmark to measure total program and consultant cost savings. The $360 million savings was calculated by taking the difference between the 1983 $2.108 billion program estimate and the April 1986 $1.748 billion program estimate. Similarly, the $101 million savings was calculated by taking the difference between the 1983 $446 million consulting cost estimate and the April 1986 $345 million consulting cost estimate.

manager and as consulting architects and engineers. The remainder was paid to other firms.

District officials said the Milwaukee program qualifies for 75 percent EPA funding because work began on all aspects of the program before EPA grants were reduced to 55 percent of total project costs.

OBJECTIVES, SCOPE, AND METHODOLOGY

At Congressman Kleczka's request, we obtained information on certain questions involving the Milwaukee Metropolitan Sewerage District's Water Pollution Abatement Program. We obtained background information on the Milwaukee program, current program conditions, and applicable federal, state, and local criteria; documented the federal and state review and approval procedures for federal and state wastewater grants and contracts; and determined whether or not the issues involved federal funds. Specifically, our objectives were to

- --determine if the grantee meets the federal criteria for an eligible grantee and identify the procedures used to monitor the use of federal funds;
- --obtain information on how district projects are funded, particularly sewer laterals, connectors, and interceptors;
- --determine the extent of competitive bidding to procure architect and engineering services;
- --obtain information on why the job site rule was not applied to CH2M Hill's overhead billings;
- --obtain information on the federal role in the district's decision to use rock from the north shore tunnel to build "Summerfest Island," and to identify the funds that will be used to build the tunnel and the island; and
- --obtain information on the Milwaukee program's architect and engineering costs, and approaches for measuring the reasonableness of such costs, as a percent of total construction costs.

We performed our work between March 30, 1986, and July 11, 1986, for the most part. We interviewed officials and collected information at the following offices: EPA's Chicago Regional Office; the U.S. Army Corps of Engineers in Milwaukee and Waukesha, Wisconsin; and the Defense Contract Audit Agency in Seattle, Washington. At the state level we interviewed officials and obtained information from the department and the Wisconsin Legislative Audit Bureau; both agencies are located in Madison, Wisconsin. We also interviewed officials and obtained documentation from the Milwaukee Metropolitan Sewerage District.

To determine if the district as grantee meets the federal criteria for an eligible grantee, we reviewed the criteria that grantees must meet to be eligible for federal and state wastewater construction grants. We also interviewed officials at EPA, the department, and the district. To identify the procedures used to monitor the district's use of federal funds, we reviewed federal, state, and local documents concerning grant and contract awards, reviews, approvals, and audits. We also interviewed officials at EPA, the Defense Contract Audit Agency, the Corps of Engineers, the department, and the district to identify each agency's role in monitoring the Milwaukee program.

To obtain information on how district projects are funded, we reviewed EPA and department regulations for awarding federal and state grants through a priority ranking system. We discussed these procedures with EPA, department, and district officials to gather information on how the priority ranking system operates. We also reviewed documents associated with the Dane County Court's annual establishment process to understand how the court order affects project funding decisions.

To determine the extent of competitive bidding in procuring architect and engineering services, we reviewed the federal and state wastewater construction grant procurement regulations. We interviewed officials at EPA, the department, the Wisconsin Legislative Audit Bureau, and the district to obtain information on how architect and engineering work was awarded for the Milwaukee program. In addition, we also reviewed documents detailing how the Milwaukee program's architect and engineering prime contractor, CH2M Hill, was selected.

To obtain information on why the job site rule was not applied to CH2M Hill's overhead billings, we reviewed audits conducted by EPA, the Defense Contract Audit Agency, and the Wisconsin Legislative Audit Bureau. We also discussed these audits with EPA, the department, and the district to obtain their views on the audit results.

To obtain information on the federal role in the district's decision to use rock from the north shore tunnel to build "Summerfest Island," we reviewed the applicable federal regulations and discussed the criteria with EPA, U.S. Army Corps of Engineers, department, and district officials. To identify the funds that would be used to construct the north shore tunnel and "Summerfest Island," we reviewed EPA and department grant award information. We also reviewed the district documents used to identify alternatives to selling the rock.

To obtain information on the Milwaukee program's architect and engineering costs and methods to measure the reasonableness of those costs, particularly as a percent of total construction, we interviewed EPA, department, Wisconsin Legislative Audit Bureau, and district officials. We obtained two sets of architect and

engineering guidelines--EPA's planning and design allowance schedules and the American Society of Civil Engineers' Manual #45--and compared the services performed for the Milwaukee program with the costs included in the guidelines. We also discussed the steps the department is taking to develop criteria to measure the reasonableness of wastewater construction architect and engineering costs statewide.

We did not independently test the grant and contract review and approval procedures identified by federal, state, and local officials nor did we verify architect and engineering cost savings estimates provided by state and local officials. However, in both instances we reviewed the applicable documents and discussed them with the cognizant agency officials.

SECTION 2

QUESTIONS ON THE MILWAUKEE METROPOLITAN SEWERAGE DISTRICT'S WATER POLLUTION ABATEMENT PROGRAM

GRANTEE ELIGIBILITY AND FUND MANAGEMENT

The district meets the federal criteria as an eligible grantee for construction grant funds. Federal regulations require grantees to have jurisdiction over sewage disposal and to monitor and account for the use of federal funds. Wisconsin law gives the district jurisdiction over the sewage disposal process in the metropolitan service area and makes the district accountable for the appropriate expenditure of federal funds.

Federal regulations do not require that a grantee operate under any specific governance structure. State administering agencies can award construction grants to a city, town, borough, county, parish, district, or any other public body created to operate and maintain a sewage treatment system. Consequently, sewage disposal can be controlled through a variety of organizational schemes, depending on local needs. By Wisconsin statute, an 11-member commission governs the district. The Milwaukee mayor appoints seven members, and an executive council, representing the surrounding suburban service area, chooses the other four.

Procedures used to monitor the use of federal funds include several reviews before and after grant funds are awarded. Before grants are made to the district, the department reviews the Milwaukee program architect and engineering contract task orders, which describe required services. The department reviews these task orders for (1) appropriateness of the professional charges and overhead rates, (2) evidence that federal and state contracting procedures were followed, and (3) evidence that the grantees properly negotiated the contact.

Construction grants are based on grantee cost projections. Before contracts are awarded, the department reviews bid package cost estimates. Besides department reviews, the U.S. Army Corps of Engineers also reviews construction bid packages for technical completeness and feasibility before the district formally solicits bids. Under interagency agreements with EPA and the department, the Corps of Engineers helps monitor Milwaukee program construction activities by reviewing bid packages, making periodic site inspections, and reviewing construction contract modifications and contract administration practices. Once the contract is awarded, the department limits the grant award to the accepted contract amount.

As a task order or construction contract nears completion, the claimed costs are audited by EPA, or a designated audit group such as the U.S. Defense Contract Audit Agency, to ensure that claims against the grant were appropriate. For example,

the Defense Contract Audit Agency audited the CH2M Hill billings for fiscal years 1978 through 1983 to determine whether the claimed expenses and direct/indirect allocation rates were allowable, allocable, and reasonable. Also, the district's internal audit group reviews final contractor billings to ensure that the expenses claimed during the contract are documented and allowable. The Corps of Engineers reviews all district contract modifications to determine whether the added charges are unavoidable or due to engineering error, and whether these costs are allowable federal grant expenses. The district files reimbursement claims against the contractor for any disallowed costs found by these audits.

In addition to these individual grant reviews, department and district management and contract administrative practices are also routinely evaluated. EPA semiannually evaluates the department's grant management and administration practices to assure that they adhere to federal standards. According to EPA Chicago Regional Office officials, the department manages and administers the construction grants program well. The department in turn monitors the district's daily grant management and administration practices. The department has an auditor assigned to examine this program, among others. The district's internal audit group also periodically reviews the district's management and contract administration practices.

DISTRICT FUNDING DECISIONS

Federal regulations require states to award wastewater construction grants through an EPA-approved ranking system. According to the regulations, the ranking system results in a priority listing of projects for which the state expects federal assistance. In ranking projects, the state must consider the availability of federal funds and the needs and water quality standards for the area. All projects for building wastewater treatment facilities, including connectors, interceptors, and treatment plant improvements, are ranked in the system. Sewer laterals are not included in the priority system because they are private property improvements and, therefore, ineligible for grant funding.

The department selects district projects for federal and state funding through an EPA-approved ranking system. Each year, the district, along with other sewerage districts and communities throughout Wisconsin, requests grant funding for a number of projects. The department ranks them using factors such as river basin location, health hazard, population size, and project type. The department awards grants to the highest ranked projects on the priority list. For the state fiscal year 1986 (July 1, 1985, to June 30, 1986), district projects accounted for 132 of the 453 wastewater projects on the state priority listing. Most of the district projects were in the top half of the priority list.

In addition to the project priority system, district projects must also meet the project completion timetables established by the Dane County Court order. The department filed a motion in the Dane County Court when the district fell behind in its 1983 implementation schedule. In 1984, the court ruled that the district must annually schedule its construction starts with the department under an annual schedule establishment process.

The annual schedule establishment process involves four principal steps. First, Milwaukee program managers develop a list of projects that should be ready for construction during the next year. Second, district staff review the list for legal, real estate, grant availability, and operational concerns. The district must submit the list to the department by June 30. Third, the department and the district negotiate a preliminary list for the next year's construction starts. Fourth, the Dane County Court reviews the negotiated list, hears unresolved issues, and then establishes a final schedule for the year's construction starts.

COMPETITIVE BIDDING

The district does not use competitive bidding procedures to award architect and engineering contracts. Federal and state regulations do not require advertised competitive bidding for architectural or engineering work. Under federal and state regulations grantees may use competitive negotiations to secure architect and engineering services.

The EPA and Wisconsin wastewater treatment plant construction grants programs have parallel procurement regulations. For example, both sets of regulations

--do not require competitive bids or price competition to secure architect and engineering services, but permit grantees to secure these services through negotiated procurement for all project phases (planning, design, and construction), and

--encourage grantees to select architect and engineering contract candidates based on demonstrated competence and qualifications to perform the required service in a manner that provides, to the maximum extent possible, open and free competition.

The competitive negotiated procurement process has three principal steps, as detailed in the federal regulations. First, the grantee issues a request for proposals. The request describes the type of services required and the criteria that will be used to evaluate the proposals. Next, the grantee

selects a contractor from the list of respondents on the basis of the stated criteria. Finally, the grantee negotiates project scope and costs with the selected contractor.

The district selected CH2M Hill as the prime contractor for the program management office using the negotiated procurement process. A district-appointed committee selected CH2M Hill from nine candidates. The committee had eight members: two from the district, two from the surrounding suburbs, and one each from the City of Milwaukee, the Milwaukee County Board, the University of Wisconsin, and the department. The committee evaluated the firms in eight areas ranging from past performance and the ability to work with the district commission, to organizational experience and the quality of the proposal presentation.

The district negotiated contract scope, responsibilities, and some of the initial tasks after CH2M Hill was selected. Each year the district and CH2M Hill supplement the initial contract by renegotiating specific Program Management Office responsibilities and costs. These negotiations determine the next year's staffing, salaries, and costs.

THE JOB SITE RULE

A job site, according to federal regulations, has relatively complete staffing and operates with a minimum of support from central and branch offices. Under the job site rule, field personnel salaries should not be increased by the addition of central or branch office indirect costs which would otherwise be allowed. If the rule were applied to the Milwaukee program, CH2M Hill's overhead billings could not include services performed at its other corporate locations. However, audits by EPA and the Defense Contract Audit Agency concluded that CH2M Hill's program management office operations do not qualify as a job site because over 30 percent of the work is routinely performed at other corporate locations.

EPA, the Defense Contract Audit Agency, and the department investigated the propriety of applying the job site rule to CH2M Hill. EPA, after reviewing CH2M Hill's labor functions, decided that the contractor's engineering services did not qualify as job site services.

The Defense Contract Audit Agency, under an interagency agreement with EPA, routinely reviewed CH2M Hill's overhead billings to verify the accuracy and propriety of the charges made against the federal grants. In total, the Audit Agency has reviewed CH2M Hill's overhead billings 13 times, expending 4,259 hours on audits covering fiscal year 1978 through 1983 billings. These audits found that between 30 and 40 percent of the engineering work is consistently performed by other CH2M

Hill locations. Based on these findings, the Audit Agency approved CH2M Hill's use of a corporate overhead rate.

The depatment reviewed the federal audit work and concurred with EPA and Audit Agency decisions that the job site rule should not apply to CH2M Hill's overhead charges. The department auditors also concluded that the overhead rates equitably allocated CH2M Hill's cost. The state applies the approved overhead rate to both federal and state grants to the district.

CH2M Hill has a matrix organizational structure that pools company experts from regions and divisions to form needed project teams. CH2M Hill employees have two supervisors: one for the specific job located at the job site and one for their technical specialty located at a central or branch office. According to CH2M Hill officials, the matrix organization enables managers to approach problems and projects with disciplinary skills held by people throughout the company. Job sites do not permanently employ a complete team of experts. Instead, company experts are on call, shifting from project to project as needs arise. Considering this organizational structure, EPA and the Defense Contract Audit Agency concluded that the job site rule did not apply to CH2M Hill.

NORTH SHORE TUNNEL ROCK

The north shore tunnel and "Summerfest Island" construction projects have not involved federal funds. State grants and local revenues have financed tunnel construction and disposal of the rock. Federal interest in the rock removed from the north shore tunnel is limited to the environmental consequences of disposal.

EPA requires grantees to have approved plans for removing debris from construction sites before construction begins. In addition to EPA approval, the Corps of Engineers must approve plans involving the waterways. EPA reviewed the district's plan for using the rock from construction sites to build an island in Lake Michigan, next to the Summerfest grounds, and found the plan environmentally sound. The Corps of Engineers reviewed the disposal plan and issued the prerequisite permit allowing the district to alter the shoreline. The department also approved the plan and allowed a portion of the cost as eligible state grant expenses.

The district considered selling the rock as one of many alternatives for disposing of the rock spoil but found it had little economic value. A district marketing survey showed that the local market for rock will be flooded by the end of the Milwaukee program. Rock from the crosstown tunnel, another part of the Milwaukee program that was under construction, is already being taken to local quarries. Some quarry operators offered to

take the additional rock, just to keep it off the market, but were unwilling to pay for it. One quarry operator stated the district would have to pay the quarry to take more rock.

A local court has issued a restraining order against Summerfest Island construction. Some surrounding Milwaukee suburbs and the four suburban representatives on the district commission filed suit charging that the district does not have the authority to build the island. However, the restraining order does not affect north shore tunnel construction. The district awarded contracts for north shore tunnel construction in June 1986. Pending legal resolution, contractors will dispose of the rock at local quarries.

PROGRAM ARCHITECT AND ENGINEERING COSTS

As of April 1986, the district estimated that the Milwaukee program's total architect and engineering costs would amount to about $344.7 million, or about 28 percent of total estimated construction costs of about $1.2 billion. Neither EPA's design allowance schedules nor private sector guidelines offer complete, comparable criteria for assessing the reasonableness of these costs. While these criteria provide for planning and design services, they do not reflect activities such as program and construction management and other special services which have been and will be included as architect and engineering costs of the Milwaukee program.

About $274 million of the $344.7 million had been spent as of April 1986. EPA planning and design grants to the district totaled approximately $100.4 million, and $98.4 million had been paid by EPA as of that time. Table 2.1 shows the program's projected architect and engineering costs by category and compares these costs to total estimated construction costs.

Table 2.1: Projected Architect and Engineering Costs as a Percentage of Construction Costs

Category	Architect and engineering cost (in thousands)	Percentage of construction costs
Facilities planning	$ 32,234	2.64
Advance facility planning	16,545	1.36
Design	95,222	7.80
Construction management services	112,790	9.24
Management and administrative services	87,927	7.21
Total	$344,718	28.25

EPA, department, and district officials told us that the Milwaukee program's architect and engineering costs are higher than for other wastewater treatment construction projects for several reasons. First, the management office is involved in all aspects of the program, managing the planning, design, and construction work and overseeing the technical integrity of the work in addition to performing planning and design services. Second, the district is under a court-imposed deadline to implement the program. Consequently, instead of sequentially ordering the work to use the fewest number of architect and engineering staff, many activities are concurrent, thereby increasing the number of staff needed. Third, in order to meet the court's schedule, contractors work concurrently to improve the old system and build the new one. In May 1986 the management office coordinated as many as 40 concurrent construction contracts to ensure that the work was efficiently and effectively performed.

EPA, department, and district officials identified two sets of guidelines for assessing the reasonableness of architect and engineering costs--guidelines developed by the American Society of Civil Engineers and EPA's planning and design allowance schedules. However, department and district officials said that the American Society of Civil Engineers' guidelines do not reflect many costs incurred in the Milwaukee program.

The American Society of Civil Engineers developed the guidelines in Manual #45 to help their clients negotiate for basic architect and engineering services. According to the

manual, the guidelines are estimates; some projects may have substantially higher or lower architect and engineering costs, depending on the services required. According to the manual, basic design services can average about 6.8 percent of total construction. As shown in table 2.1, design services for the Milwaukee program are 7.8 percent of estimated construction costs. Basic design services include, according to the manual,

--determining project size and scope;

--developing detailed drawings, contract documents, and estimates; and

--securing construction bids and making periodic site inspections during construction.

According to the manual, the basic cost guidelines do not include many special design services required by most large-scale construction projects. The manual states that these costs may add at least 18 percent to total architect and engineering costs. The manual divides the 18 percent as follows. Field surveys can add 3 percent, preparing grant documents and providing resident engineer services can add another 12 percent, and simple legal and administrative services can add 3 percent to the total architect and engineering costs. Combined with the average 6.8 percent for basic services, architect and engineering costs could amount to almost 25 percent of total construction costs using the manual guidelines. The Program Management Office performs and/or oversees the technical adequacy of these services.

In addition to special design services, the manual states that infiltration and inflow studies, geotechnical tests, and environmental impact statements will also increase architect and engineering costs but does not cite specific percentages for these studies and tests. Infiltration and inflow studies, as well as geotechnical tests and environmental impact statements, are included in the Milwaukee program's architect and engineering costs. The manual also warns that architect and engineering fees for projects involving alterations and changes to existing systems are substantially higher than the fees for building a new system; however, the manual provides no estimates for how much more such work could cost. The Milwaukee program involves a substantial amount of work on existing facilities as well as new construction. For example, part of the program is to improve and expand the capacity of the two Milwaukee treatment plants, and another part of the program is to rehabilitate existing sewers.

In 1981 the Congress eliminated planning and design grants for the wastewater treatment program and required EPA to develop allowance schedules. Allowance schedules are used to reimburse grantees for a portion of their planning and design costs.

These schedules list reimbursement ratios that EPA multiplies by projected construction costs to determine the grantee's planning or design allowance. The Milwaukee program does not receive a planning allowance because the planning work was funded before the federal planning grants were eliminated and the allowance schedules instituted.

According to EPA Chicago Regional Office officials, the Milwaukee program's total architect and engineering costs are higher than the EPA allowance schedules because the schedules do not include many of the architect and engineering services performed for the program. For example, the EPA design allowance schedule provides a 3.4 percent allowance for a $200 million project--the highest construction cost reflected in the schedules. However, the EPA allowance schedule does not include design services that are provided by the management office such as reviewing bids, drawings, and change orders and making periodic job site visits. The other architect and engineering costs shown in table 2.1 are also not included in the design allowance schedule.

Wisconsin is taking steps to monitor architect and engineering costs for wastewater construction grants statewide. The department is developing evaluation criteria which will show whether architect and engineering costs for wastewater construction projects are lower than, comparable to, or higher than architect and engineering costs for similar size and type projects. The criteria will not be used to retroactively review projects, but will be used to evaluate the reasonableness of new state architect and engineering contracts. Department officials said the criteria should be implemented in late 1986 and will be used on future Milwaukee program projects.

In addition, the district completed a study in August 1983 to determine whether the nonconstruction costs of the Milwaukee program compared favorably with other large public works projects in the United States. The study identified one wastewater treatment project and three airport and transportion system construction projects that were similarly managed. The study concluded, on the basis of projections of final nonconstruction costs, that the Milwaukee program is within the bounds of similar projects.

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